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H4T
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GBA 2015801
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GB 1535008
GB 1454349
US 4245539
US 3922944
US 3747233
US 3091454
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G5X
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(54) Educational toy

(57) The toy includes mat means (1) arranged as a plurality of areas designated by numbers, letters, or the like, and output means such as a musical note generator (3) controllable by the mat means to provide a specific auditory and/or visual output according to the area stepped on. The auditory outputs include musical tones and spoken numbers, letters or words. The visual outputs include displays of numbers, letters, and the like and may be effected by means of a TV receiver or a seven-segment display.

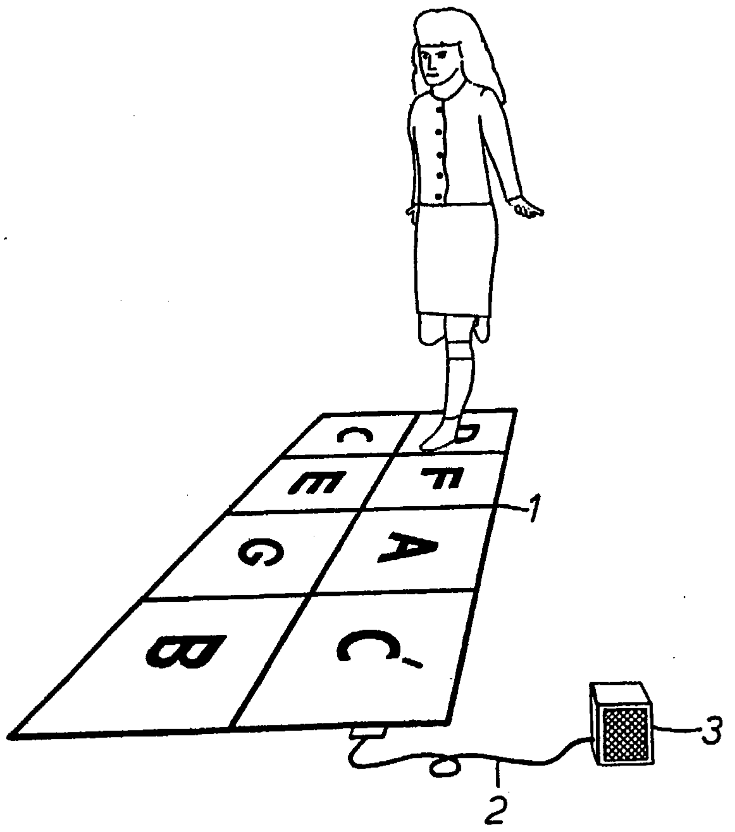

FIG. 3.

The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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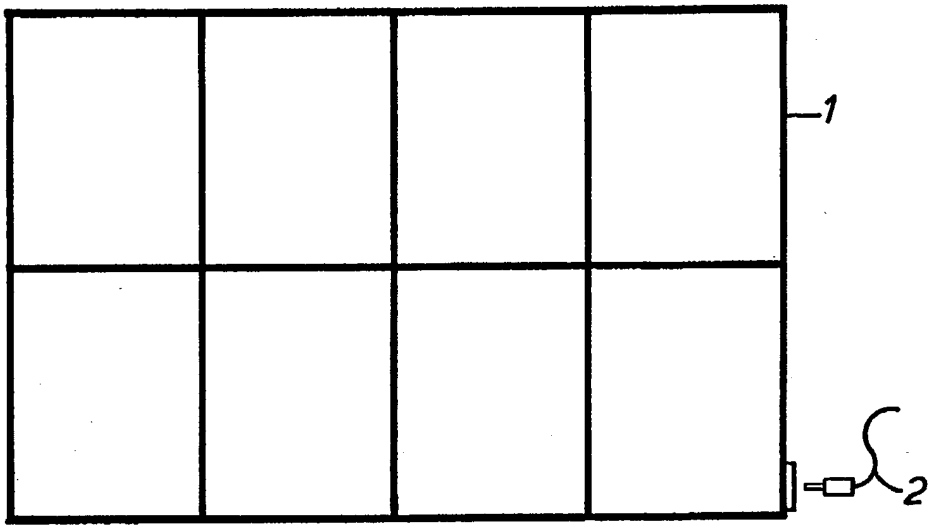

FIG. 1.

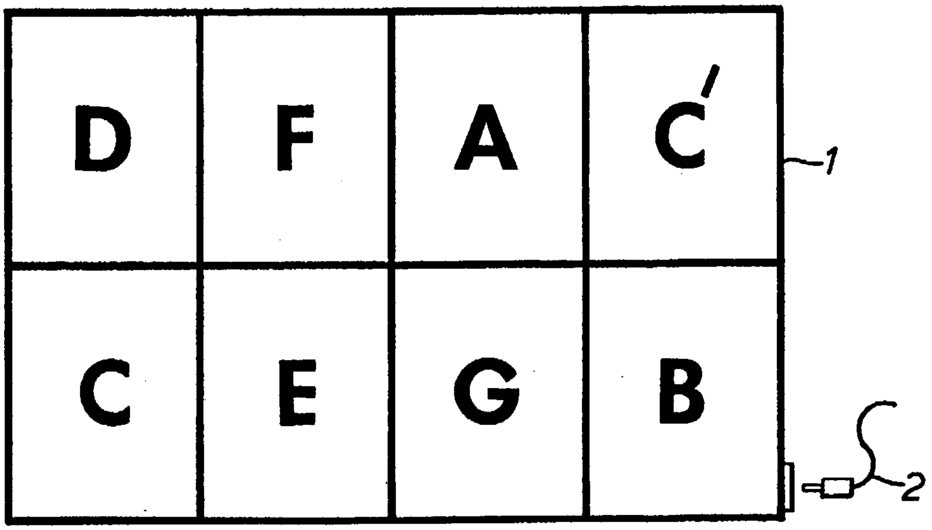

FIG. 2.

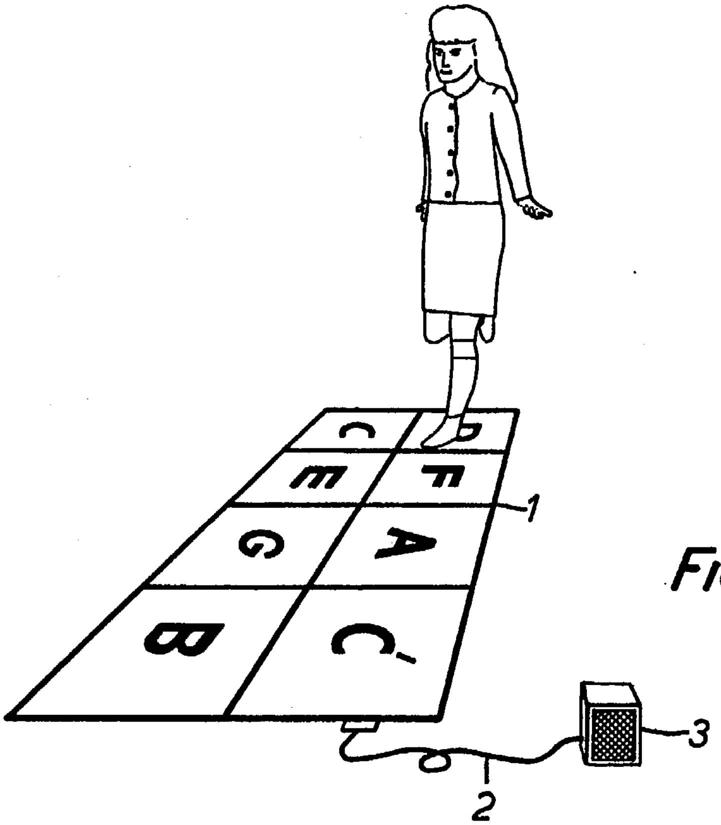

FIG. 3.

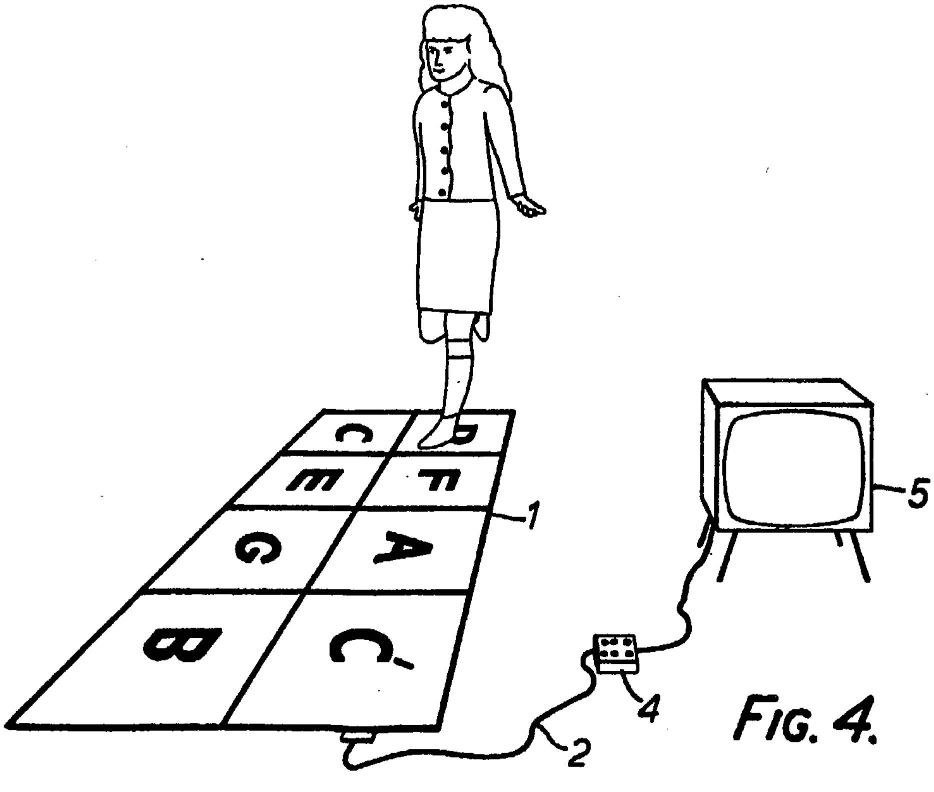

FIG. 4.

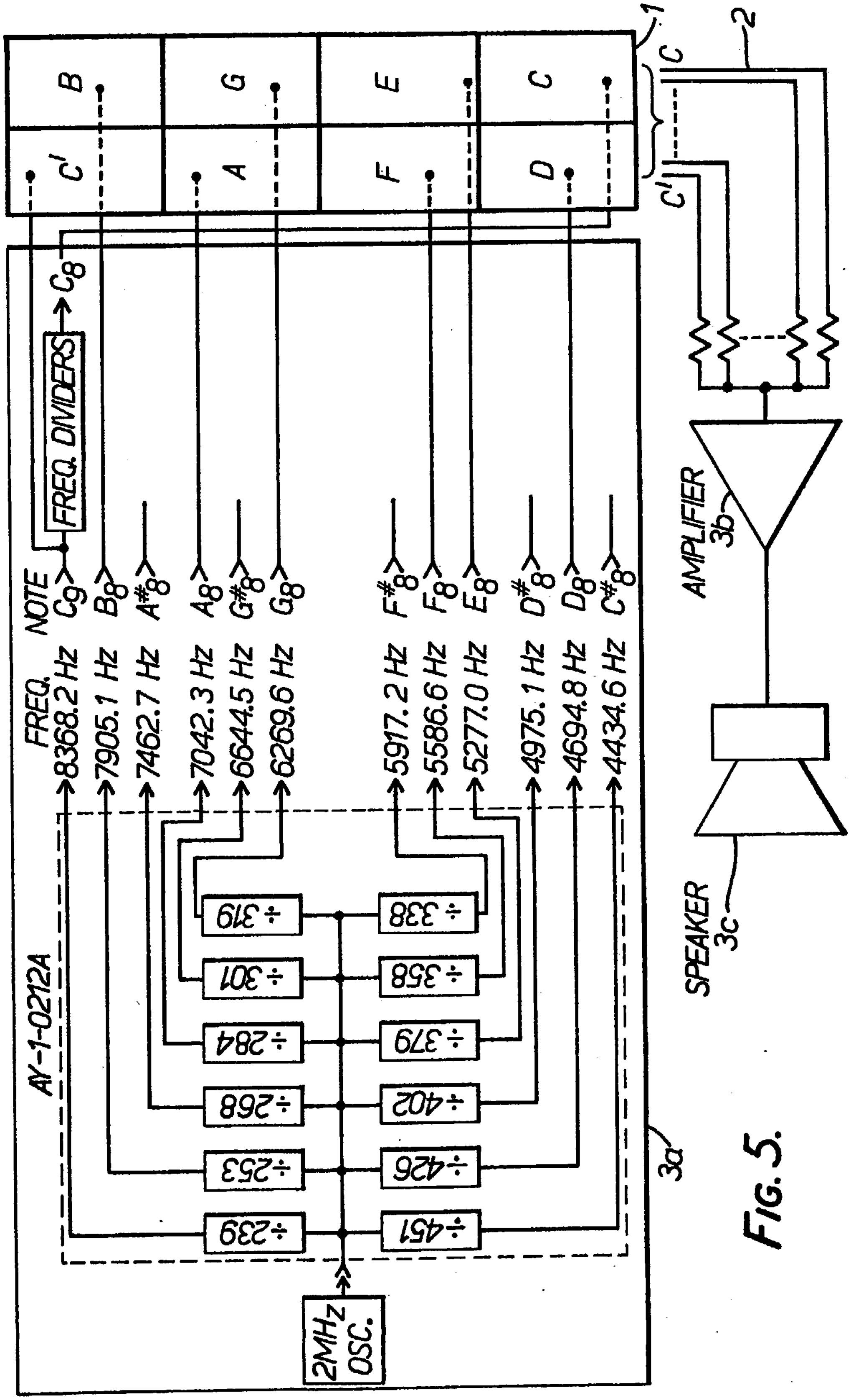
1
2
C
C'
B
G
E
C
C'
A
F
D
FREQ. DIVIDERS
C8
NOTE
C9
B8
A#8
A8
G#8
G8
F#8
F8
E8
D#8
D8
C#8
FREQ.
8368.2 Hz
7905.1 Hz
7462.7 Hz
7042.3 Hz
6644.5 Hz
6269.6 Hz
5917.2 Hz
5586.6 Hz
5277.0 Hz
4975.1 Hz
4694.8 Hz
4434.6 Hz
AY-1-0212A
÷319
÷301
÷284
÷268
÷253
÷239
÷338
÷358
÷379
÷402
÷426
÷451
2MHz OSC.
3a
AMPLIFIER
3b
SPEAKER
3c

FIG. 5.

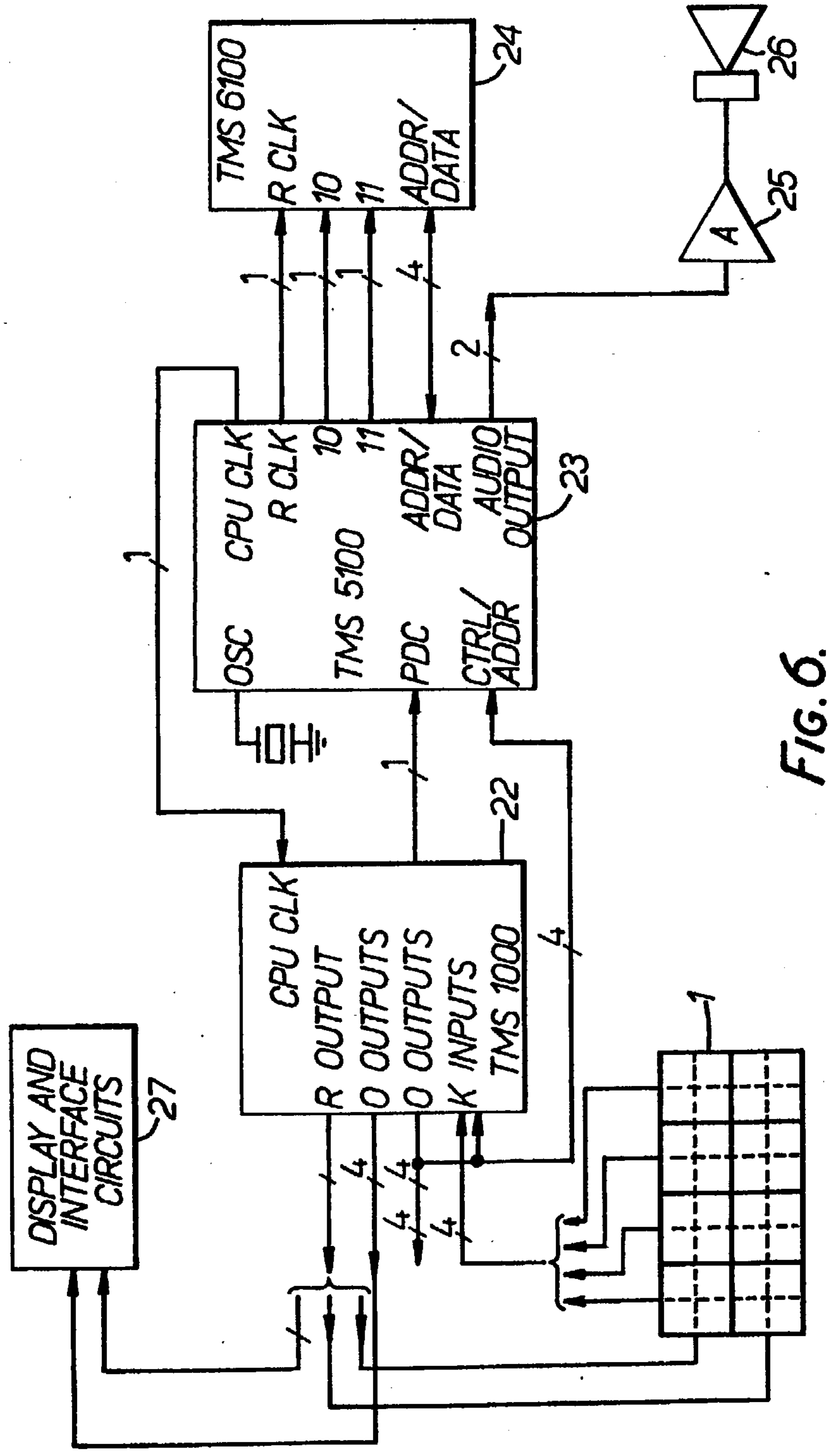
TMS 6100
R CLK
10
11
ADDR/ DATA
24
26
25
A
1
1
1
4
2
1
CPU CLK
R CLK
10
11
ADDR/ DATA
AUDIO OUTPUT
23
OSC
TMS 5100
PDC
CTRL/ ADDR
1
22
CPU CLK
R OUTPUT
O OUTPUTS
O OUTPUTS
K INPUTS
TMS 1000
4
DISPLAY AND INTERFACE CIRCUITS
27
4
4
4
4
1

FIG. 6.

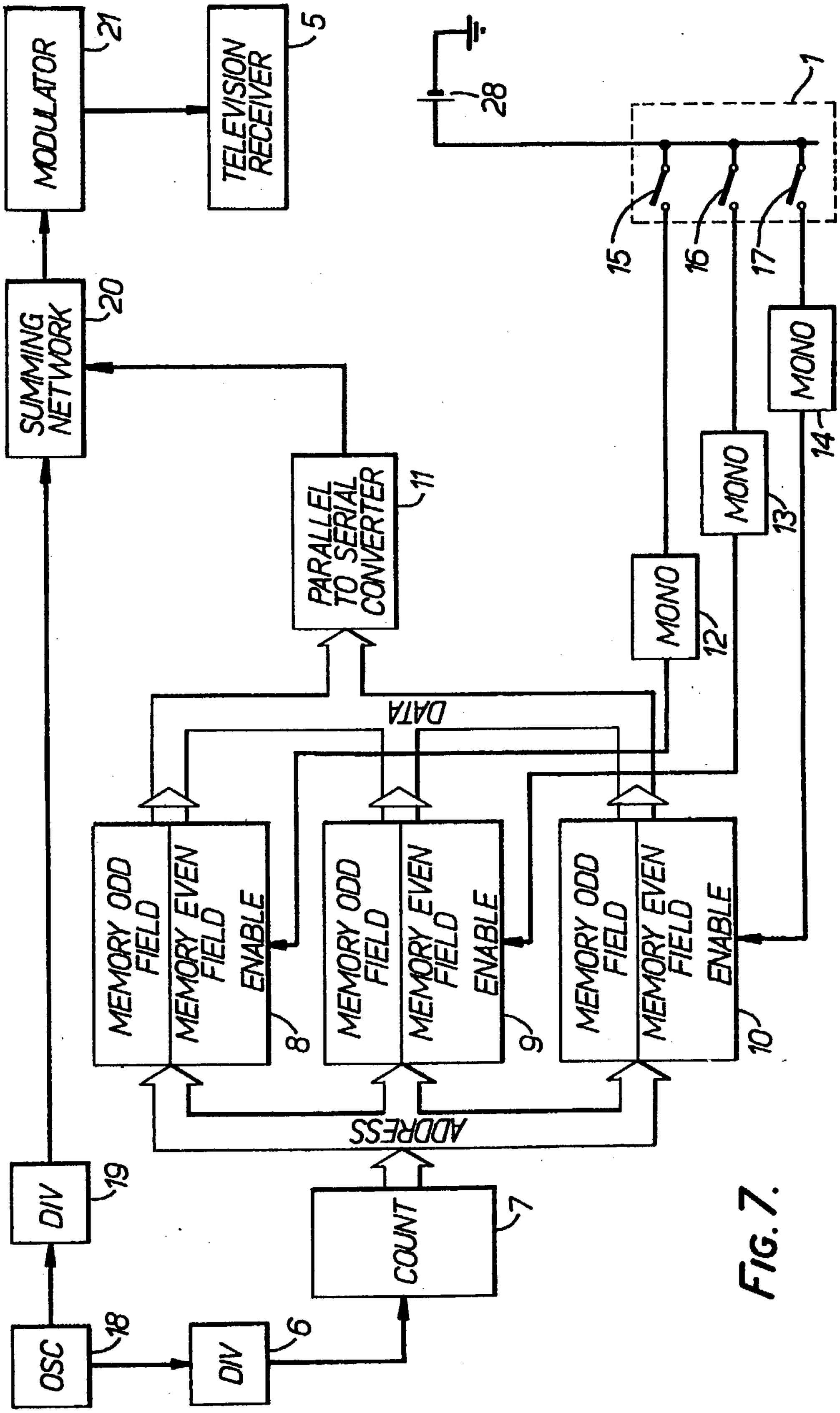
MODULATOR
21
TELEVISION RECEIVER
5
28
1
SUMMING NETWORK
20
15
16
17
MONO
14
MONO
13
PARALLEL TO SERIAL CONVERTER
11
MONO
12
DATA
MEMORY ODD FIELD
MEMORY EVEN FIELD
ENABLE
8
MEMORY ODD FIELD
MEMORY EVEN FIELD
ENABLE
9
MEMORY ODD FIELD
MEMORY EVEN FIELD
ENABLE
10
ADDRESS
DIV
19
COUNT
7
OSC
18
DIV
6

FIG. 7.

SPECIFICATION
Educational Toy

The invention relates to an educational toy particularly suitable for instructing a child.

Toys for children are often presented as toys to be used as self-instructional or educational aids.

As a rule, toys intended to give intellectual self-instruction require a significant level of manual skill on the part of the user for correct operation.

Traditional teaching aids tend to ignore a young child's natural dexterity with his feet. This natural ability and interest for exploring through his moving feet is grossly under-utilised as an educational input. Given the proper equipment, the young child can learn a very wide range of subjects through movement of his feet.

It is an object of the present invention to provide an educational toy which uses this natural dexterity, with his feet to enable the child to learn. That is, the invention provides a teaching aid suitable for foot operation by a child.

According to the invention, an educational toy includes mat means arranged as a plurality of areas, output means capable of providing a plurality of auditory or visual outputs, and means connecting the mat means to the output means, the arrangement being such that, in operation, a specific auditory or visual output is selected by stepping on a specific area of the mat means.

The output means may be a musical note generator. The musical note generator may be such as to provide the eight notes of a major scale, requiring a mat arranged as eight areas, the musical note generator may include the remaining notes of a chromatic scale, requiring a mat arranged as more than eight areas. The major scale may be in the key *C*.

The musical note generator may include an oscillator and plurality of electrical divider circuits arranged to receive the oscillator output signal. The musical tone generator may include additional electrical divider circuits to provide additional lower musical notes as required.

Alternatively, the output means may be such as to indicate numbers, words, or the like, either in auditory or visual form.

The output means may include a voice synthesiser capable of speaking letters, numbers, or words, designating the different areas of the mat.

The output means may include display means, for example, a television receiver, or one or more devices capable of displaying letters and/or numbers.

The mat means may be marked out as a plurality of areas or it may be made up of a plurality of separate pieces each representing an area. The areas of the mat means may be designated by different letters, colours, symbols or numbers.

Each area may incorporate a pressure responsive device which, when the area is stepped on, stimulates the output means to produce the output appropriate to the area. Alternatively, the pressure responsive devices may be located in the connecting means or even in the output means.

Yet again, each area may be fitted with a so-called "touch" switch which is connected to control the output means.

Any other device responsive to the presence of a user's foot on or near a specific area may be used to control the output means.

In a simple embodiment of the invention, a single output means, for example a loudspeaker, is used and the arrangement is such that the output produced characterises the area first stepped on, all other areas being isolated from the output means. The output may continue for as long as the user's foot is positioned on the area or it may continue for a preselected time only.

However, in a more advanced embodiment, the output means is capable of response to the simultaneous presence of feet in at least two different areas. It is envisaged that the toy may be used simultaneously by two or more "players".

It may be desirable to incorporate multiple display means or sound emitters in the output means in order to increase the range of auditory and/or visual outputs available.

The mat means may be a soft mat or board or a combination of rigid and resilient components capable of providing a play surface.

An educational toy according to the invention will now be described by way of example only and with reference to the accompanying drawings, in which:

Fig. 1 represents a plan view of a mat marked out as a plurality of rectangular areas,

Fig. 2 represents a plan view of the mat of Fig. 1 in which each rectangular area is designated by a letter,

Fig. 3 represents a perspective view of the mat of Fig. 2, in use, controlling a musical note generator, and

Fig. 4 represents a perspective view of the mat of Fig. 2, in use, controlling a television receiver.

Fig. 5 is a diagrammatic representation of an electrical system capable of providing eight musical notes in the key *C*, with a mat with eight areas,

Fig. 6 is a diagrammatic representation of an electrical system capable of providing speech and a visual display with a mat with eight areas,

Fig. 7 is a diagrammatic representation of an electrical system capable of providing a visual display on a television receiver, with a mat with three areas.

Referring to Fig. 1, a mat 1 is marked out as a plurality of rectangular areas by means of grid lines.

Each area of the mat 1 includes a pressure-operated switch (not shown) which, when operated by its area being stepped on, signals, by way of a cable connection 2, to an output device (not shown).

Referring to Fig. 2, each rectangular area of the mat 1 of Fig. 1 is designated by a letter corresponding to a musical note, the respective areas being designated D, F, A, C' (top C), C, E, G and B. The letters are presented in different colours in order to provide the maximum visual stimulation to a user.

Referring to Fig. 3, the mat 1 of Fig. 2 is shown connected to a musical generator 3 which is capable of producing musical notes D, F, A, C′ (top C), C, E, G and B. The arrangement of the pressure switches (not shown), the cable connection 2, and the musical generator 3 is such that the musical note D is produced when the area D of the mat 1 is stepped on, the musical note C is produced when the area C of the mat 1 is stepped on, and so on. Such an embodiment might be described as "Step into Music".

The musical note generator 3 employs an octave generator (not shown), for example, a General Instruments Type AY—1—0212A Top Octave Generator driven by a 2 MHz oscillator.

The Type AY—1—0212A Top Octave Generator generates, by division, electrical signals having the frequencies of the respective musical notes. The electrical signals are applied to electro-acoustic transducer means, included in the tone generator 3, as dictated by the pressure switches (not shown) in the mat 1, to produce the required musical notes according to the area of the mat stepped on.

Referring to Fig. 5, an arrangement for musical note generation by the use of a Type AY—1—0212A Top Octave Generator employs a multiple frequency generator which provides electrical signals at 4184.1 Hz, 4694.8 Hz, 5277.0 Hz, 5586.6 Hz, 6269.6 Hz, 7042.3 Hz, 7905.1 Hz, 8368.2 Hz. The various electrical signals are obtained by dividing a 2 MHz signal by the ratios 478, 426, 379, 358, 319, 284, 253, and 239, respectively. The 2 MHz signal is provided by a fixed frequency oscillator and the division ratios 426 to 239 are provided in the AY—1—0212A. An additional divider is used to provide by division ratio of 478. The 4184.1 Hz signal from the multiple frequency generator 3*a* goes to a switch (not shown) associated with the area *C* of the mat 1, the 4694.8 Hz signal to a switch (not shown) associated with the area *D* of the mat 1, and so on, finally, the 8368.2 Hz signal going to a switch (not shown) associated with the area *C′* of the mat 1. The switches are so arranged that, when closed, they connect a respective one of the signals from the multiple frequency generator 3*a* to an audio amplifier 3*b* by way of an element of the cable connection 2 and a resistor. The plurality of resistors acts as a summing network for the signals conveyed by the cable connection 2. The output port of the audio amplifier 3*b* is connected to a loudspeaker 3*c*.

The circuit arrangement represented by Fig. 5 is capable of providing a musical note corresponding to any one of the frequencies generated by the multiple frequency generator 3*a*, according to which switches are closed. The switches associated with respective areas of the mat 1 are, of course, closed when the relevant area is stepped on. The musical notes represented in Fig. 5 by C′ and *A* to *F* are the notes of a major scale in the key *C*.

The AY—1—0212A provides also the frequencies for the remainder of the chromatic scale. Additional notes corresponding to the remainder of the chromatic scale may be provided by adding areas to the mat and providing appropriately connected switches to allow routing of the remaining signals from the AY—1—0212A to the audio amplifier 3*b*. Lower octaves may be obtained by successive division by two, of the frequencies provided by the multiple frequency generator 3*a*. Other top octave generators available either from General Instruments or from other manufacturers are suitable for use in the multiple frequency generator 3*a*.

Fig. 6 is referred to as a representation of an alternative arrangement for auditory output. In an arrangement as represented by Fig. 6, a speech output is provided in place of a musical note output. Speech output is provided by means of a voice synthesiser system employing a microprocessor 22, a voice synthesis processor 23, and a voice synthesis memory 24, controlled by the switches (not shown) which are actuable by stepping on the mat 1. The speech output is provided by the voice synthesis processor 23 which provides an audio output signal. The audio output signal is amplified by an audio amplifier 25 and is then applied to a speaker 26.

In the arrangement represented by Fig. 6, the switches (not shown), which are actuable by a person stepping on the mat 1, are arranged as cross-point switches which, when actuated, connect respective *R* output lines of the microprocessor 22 to four *K* input lines of the microprocessor 22. A pulse signal which appears on a *K* input line is thus a pulse supplied on an *R* output line of the microprocessor 22 and is recognised by the microprocessor 22 as an instruction to obtain a particular speech output from the voice synthesis processor 23. The microprocessor 23 applies the appropriate instruction codes by way of four *O* output lines to a CTRL/ADDR. line of the voice synthesis processor 23 and strobes the instructions into the voice synthesis processor 23 by applying strobe signals to a PDC input line of the voice synthesis processor 23. The voice synthesis processor 23 obtains data from the voice synthesis memory 24 on ADDR/DATA lines and provides synthesised speech signals on an AUDIO OUTPUT line as instructed. The microprocessor 22 is able to check on the status of the voice synthesis processor 23 by applying a TEST TALK signal to the PDC line of the voice synthesis processor 23 and receiving on its *K* input lines the response from the CTRL/ADDR. lines of the voice synthesis processor 23.

In the arrangement represented by Fig. 6, the microprocessor 22 also provides output signals capable of causing the display of members, letters, or the like corresponding to those on the mat 1, the output signals being provided on *R* and *O* output lines of the microprocessor 22. The output signals from the microprocessor 22 are applied to display and interface circuits 27 appropriate to the form of the display device. The display device may include a seven-segment display or displays or the display device may be a television receiver.

In the arrangement represented by Fig. 6, the microprocessor 22 is one of the TMS 1000 family of devices, the voice synthesis processor 23 is a TMS 5100 device, and the voice synthesis memory 24 is a TMS 6100 device. Details of the TMS 1000 family of microprocessors are published in a booklet entitled "TMS 1000 Series Data Manual", details of the TMS 5100 in a booklet entitled "TMS 5100 Voice Synthesis Processor Data Manual", and details of the TMS 6100 in a booklet entitled "TMS 6100 Voice Synthesis Memory Data Manual". Additional information is available from a booklet entitled "MOS Integrated Circuit for Voice Synthesis." All the above components and publications are available from Texas Instruments.

Referring to Fig. 4, the mat 1 is shown connected, by way of a cable connection 2 and a converter 4, to a television receiver 5.

The arrangement of the pressure switches (not shown), the cable connection 2, and the converter 4, is such that the television receiver 5 produces a display of the letter D when the area D of the mat 1 is stepped on, the television receiver 5 produces a display of the letter C when the area C of the mat 1 is stepped on, and so on. This embodiment might be described as "Step into Words".

It will be evident that the display of a letter on the television receiver 5 could be accompanied by an auditory output giving the pronunciation of the letter being displayed.

Referring now to Fig. 7, an electrical system capable of providing signals for a television receiver 5 to display three symbols represented by areas on a mat 1 includes switches 15, 16, and 17 in the mat 1, monostable multivibrators 12, 13, and 14, a counter 7, three memory devices 8, 9, and 10, an oscillator 18, dividers 6 and 19, a parallel to serial converter 11, a summing network 20, a modulator 21, and a battery 28.

In the electrical system represented by Fig. 7, closure of the switch 15, say, by a person stepping on the mat 1, switches on the monostable multivibrator 12 for a set period, and the monostable multivibrator 12 selects the memory device 8 for operation. The counter 7 sweeps through the addresses of all the data in the memory device 8 causing the data held in the memory device 8 to be transmitted to the parallel to serial converter 11. The serial data is applied to a modulator 21 by way of a summing network 20 to the television receiver 5, and is displayed. The summing network 20 and the modulator 21 are also supplied with line and field synchronising pulses from the oscillator 18 by way of the divider 19. The oscillator 18 supplies pulses to the counter 7 by way of the divider 6. Closure of the switch 16 results in the use of the monostable multivibrator 13 to select the memory device 9 for the control of the display, and the closure of the switch 17 results in the operation of the monostable multivibrator 14 and brings the memory device 10 into use.

In the electrical system represented by Fig. 7, each symbol to be displayed is stored in a memory device as a pattern of binary values giving rise to respective light and dark areas when displayed on a television receiver screen. The binary values are stored as odd and even fields corresponding to the two interlaced fields of a television frame.

More than three switches may be included in the electrical system represented by Fig. 7 in order to permit the display of more than three symbols. An additional monostable multivibrator and an additional memory device is required for each additional switch present. The switches and battery may be replaced by binary signals from a microprocessor such as that included in Fig. 6, in order to provide a system in which the display of each symbol is accompanied by a pronunciation of the symbol.

It is, of course, possible to use many other different symbols to designate the areas of the mat. For example, a number designation might be employed to acquaint a user with different numbering systems and such an embodiment might be described as "Step into Numbers". There is also the possibility of a "Step into Words".

CLAIMS

1. An educational toy including mat means arranged as a plurality of areas, output means capable of providing a plurality of auditory or visual outputs, and means connecting the mat means to the output means, the arrangement being such that, in operation, a specific auditory or visual output is selected by stepping on a specific area of the mat means.

2. An educational toy as claimed in claim 1, wherein the output means includes a musical note generator.

3. An educational toy as claimed in claim 2, wherein the musical note generator includes an oscillator and a plurality of dividers providing a plurality of signals from the oscillator output signal.

4. An educational toy as claimed in claim 1, wherein the output means includes a voice synthesiser capable of providing outputs convertible by an electroacoustic transducer to the pronunciations of selected letters.

5. An educational toy as claimed in claim 1, wherein the output means includes a voice synthesiser capable of providing outputs convertible by an electroacoustic transducer to the pronunciation of selected numbers.

6. An educational toy as claimed in claim 1, wherein the output means includes a voice synthesiser capable of providing outputs convertible by an electroacoustic transducer to the pronunciation of selected words.

7. An educational toy as claimed in any one of claims 1 to 6, wherein the output means includes display control means capable of generating display signals corresponding to respective areas

of the mat means.

8. An educational toy as claimed in claim 7, wherein the display control means is capable of controlling a television receiver.

9. An educational toy as claimed in claim 7, wherein the display control means is capable of controlling a plurality of seven-segment display devices.

10. An educational toy as claimed in any one of claims 1 to 9, wherein the mat means includes a mat member marked out as a plurality of areas.

11. An educational toy as claimed in any one of claims 1 to 9, wherein the mat means includes a plurality of separate pieces each representing an area.

12. An educational toy as claimed in any one of claims 1 to 11, wherein each area of the mat means is arranged to be distinguishable from the other areas.

13. An educational toy as claimed in any one of claims 1 to 12, wherein each area of the mat means includes a pressure responsive device capable of so stimulating the output means as to produce an output to the area.

14. An educational toy as claimed in any one of claims 1 to 12, wherein each area of the mat means includes a touch switch capable of so stimulating the output means as to produce an output appropriate to the area.

15. An educational toy as claimed in any one of claims 1 to 14, wherein the arrangement is such that the output produced characterises the area first stepped on, all other areas being isolated from the output means.

16. An educational toy as claimed in claim 15, wherein the arrangement is such that the output continues for as long as the user's feet is positioned on the area.

17. An educational toy as claimed in claim 15, wherein the arrangement is such that the output continues for a preselected time after the user's feet is positioned on the area.

18. An educational toy as claimed in any one of claims 1 to 14, wherein the arrangement is such that the output means is capable of response to the simultaneous presence of feet in at least two different areas.

19. An educational toy substantially as herein described with reference to and as illustrated by Figs. 1 to 3, or Figs. 1 to 3 and 5, or Figs. 1, 2 and 4, or Fig. 6, or Fig. 7, of the accompanying drawings.

20. Mat means for an educational toy capable of providing a plurality of auditory or visual outputs in response to the mat means being stepped on, the mat means being arranged as a plurality of areas each bearing a characteristic mark or the like and each including switch means arranged to operate when the area of the mat is stepped on.

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